

### **Amendments to the Claims:**

Claims 1-32 are pending in this application. Claims 1-32, as originally filed, are provided as follows:

- 1                   1. (original) A virtual storage system comprising:  
2                   a computing device accessing virtual storage;  
3                   a plurality of physical storage devices; and  
4                   a controller in communication with the computing device and the  
5 plurality of physical storage, the controller operative to  
6                   (a)     receive a virtual storage access request from the computing  
7                   device specifying a virtual data access, the virtual data access  
8                   comprising a plurality of blocks, each of the plurality of blocks  
9                   associated with one of at least two target physical storage  
10                  devices, the target physical storage devices comprising at least  
11                  a subset of the plurality of physical storage devices;  
12                  (b)     determine an access sequence associating one target storage  
13                  device with each block in the received virtual storage access  
14                  request;  
15                  (c)     send at least one physical access request to each target storage  
16                  device;  
17                  (d)     receive at least one error message from at least one target  
18                  storage device, each error message having an error type; and  
19                  (e)     determine an error response based on the error message type  
20                  and on the access sequence.
  
- 1                   2. (original) A virtual storage system as in claim 1 wherein received  
2 error message types comprise communication error and access error.

1                   3. (original) A virtual storage system as in claim 1 wherein the  
2 determined error response comprises terminating the virtual storage access if the  
3 received error type comprises a communication error.

1                   4. (original) A virtual storage system as in claim 1 wherein the  
2 determined error response comprises terminating each physical access request  
3 corresponding to a block in the access sequence later then a problematic block, the  
4 problematic block one of the plurality of blocks an attempted access of which  
5 generates at least one error message.

1                   5. (original) A virtual storage system as in claim 4 wherein the  
2 virtual storage access comprises a read operation from the computing device, the  
3 controller returning to the computing device blocks in the access sequence prior to  
4 the problematic block.

1                   6. (original) A virtual storage system as in claim 1 wherein the  
2 determined error response comprises terminating each physical access request  
3 corresponding to a block in the access sequence later then a problematic block, the  
4 problematic block one of the plurality of blocks an attempted access of which  
5 generates a communication error.

1                   7. (original) A virtual storage system as in claim 6 further comprising  
2 returning an indication of an access error to the computing device.

1                   8. (original) A virtual storage system as in claim 1 wherein the  
2 determined error response comprises terminating each physical access request  
3 corresponding to a block in the access sequence later then a problematic block, the  
4 problematic block one of the plurality of blocks an attempted access of which  
5 generates an access error.

1                   9. (original) A virtual storage system as in claim 1 wherein the error  
2 response includes an indication of the first block in the access sequence the access of  
3 which generates an error message.

1                   10. (original) A method of servicing a virtual storage request placed  
2 by a computing device, the virtual storage request specifying a plurality of blocks,  
3 the blocks distributed between at least two physical target storage devices, the method  
4 comprising:  
5                   determining an access sequence associating one target storage device  
6 with each block in the virtual storage request;  
7                   sending at least one physical access request to each target storage  
8 device;  
9                   receiving at least one error message, each error message sent from one  
10 target storage device, each error message having one of a plurality of error types; and  
11                   determining an error response based on the error type for at least one  
12 error message and on the access sequence.

1                   11. (original) A method of servicing a virtual storage request as in  
2 claim 10 wherein the error types comprise a communication error and an access  
3 error.

1                   12. (original) A method of servicing a virtual storage request as in  
2 claim 10 wherein the error message has a communication error type indicating the  
3 target storage device sending the error message is unavailable, the error response  
4 comprising terminating each physical access request for all target storage devices.

1                   13. (original) A method of servicing a virtual storage request as in  
2 claim 10 wherein the error message has an access error type indicating the target  
3 storage device cannot access a problematic block, the error response comprising

4 terminating each physical access request for any block in the access sequence after  
5 the problematic block.

1 14. (original) A method of servicing a virtual storage request as in  
2 claim 13 wherein the virtual storage request is a read request, the error response  
3 further comprising sending to the computing device all blocks in the access sequence  
4 before the problematic block.

1 15. (original) A method of servicing a virtual storage request as in  
2 claim 10 wherein the error message has a communications error type, the error  
3 response comprising terminating each physical access request for any block in the  
4 access sequence after the problematic block.

1 16. (original) A method of servicing a virtual storage request as in  
2 claim 15 wherein the virtual storage request is a read request, the error response  
3 further comprising sending to the computing device all blocks in the access sequence  
4 before the problematic block.

1 17. (original) A method of servicing a virtual storage request as in  
2 claim 10 wherein determining an error response comprises:  
3 determining a first problematic block in the access sequence as the first  
4 occurring block in the access sequence the attempted access of which returned an  
5 error message; and  
6 returning an indication of the first problematic block to the computing  
7 device placing the virtual storage request.

1 18. (original) A method of servicing a virtual storage request as in  
2 claim 10 wherein determining an error response comprises:  
3 determining as a first problematic block the first block in the access  
4 sequence the access attempt of which generated an error message;

5                   determining the error type for the first problematic block; and  
6                   forwarding the determined error type to the computing device placing  
7 the virtual storage request.

1                   19. (original) A method of servicing a virtual storage request as in  
2 claim 10 wherein determining an error response comprises:

3                   determining as a first problematic block the first block in the access  
4 sequence the access attempt of which generated an error message;

5                   determining the error type for the first problematic block as a  
6 communication error; and

7                   forwarding an access error type message to the computing device  
8 placing the virtual storage request.

1                   20. (original) A method of servicing a virtual storage request placed  
2 to a virtual storage device, the virtual storage request comprising a logical sequence  
3 of a plurality of blocks stored on a plurality of physical storage devices, the physical  
4 storage devices comprising the virtual storage device, the method comprising:

5                   placing at least one physical storage request to each of the plurality of  
6 physical storage devices, each physical storage request requesting access to at least  
7 one of the plurality of blocks stored on the physical storage device targeted by the  
8 physical storage request;

9                   receiving a response from each targeted physical storage device  
10 corresponding to each physical storage request, each response comprising a  
11 successful response or an error response, the error response indicating an error type;

12                   for each error response, determining if the error type is an access  
13 error, the access error indicating the targeted physical storage device could not access  
14 a problematic block, the problematic block requested in the corresponding physical  
15 storage request; and

16                   if the error type is an access error, canceling all active physical storage  
17 requests later in the logical sequence than the problematic block.

1                   21. (original) A method of servicing a virtual storage request as in  
2 claim 20 further comprising canceling all active physical storage requests if the error  
3 type is a communication error indicating the targeted physical storage device  
4 receiving the corresponding physical storage request is unavailable.

1                   22. (original) A method of servicing a virtual storage request as in  
2 claim 20 further comprising canceling any active physical storage requests later in the  
3 logical sequence then the problematic block if the error type is a communication error  
4 indicating the targeted physical storage device receiving the corresponding physical  
5 storage request is unavailable.

1                   23. (original) A method of servicing a virtual storage request as in  
2 claim 20 wherein the virtual storage request comprises a read request, the method  
3 further comprising forwarding to a computing device placing the virtual storage  
4 request all blocks in the logical sequence prior to the problematic block.

1                   24. (original) A method of servicing a virtual storage request as in  
2 claim 20 further comprising returning an error indication comprising an indication  
3 of a first problematic block, the first problematic block being the first block in the  
4 logical sequence the access of which generates an error response.

1                   25. (original) A virtual storage system comprising:  
2                   a plurality of physical storage devices, each physical storage device  
3 storing information as a plurality of blocks, each physical storage device responding  
4 to a failed physical access request with an error message having one of a plurality of  
5 error types; and

6 a controller responding to a virtual storage request for a sequence of  
7 blocks stored on at least two of the physical storage devices, the controller operative  
8 to

- 9 (a) determine an access sequence associating one physical storage  
10 device with each block in the virtual storage request,
- 11 (b) send at least one physical access request to each physical  
12 storage device listed in the access sequence,
- 13 (c) receive at least one error message from at least one of the  
14 physical storage devices in the access sequence, and
- 15 (d) determine an error response based on the error type for at least  
16 one error message and on the access sequence.

1 26. (original) A virtual storage system as in claim 25 wherein the  
2 error types comprise a communication error and an access error.

1 27. (original) A virtual storage system as in claim 25 wherein at least  
2 one received error message has a communication error type, each physical access  
3 request for all physical storage devices in the access sequence terminated by the  
4 controller.

1 28. (original) A virtual storage system as in claim 25 wherein a  
2 received error message has an access error type indicating the physical storage device  
3 sending the received error message cannot access a problematic block, each physical  
4 access request for any block in the access sequence after the problematic block  
5 terminated by the controller.

1 29. (original) A virtual storage system as in claim 28 wherein the  
2 virtual storage request comprises a read request, the controller further returning all  
3 blocks in the access sequence before the problematic block in response to the virtual  
4 storage request.

1                   30. (original) A virtual storage system as in claim 25 wherein a  
2 received error message has a communication error type, each physical access request  
3 for any block in the access sequence after the problematic block terminated by the  
4 controller.

1                   31. (original) A virtual storage system as in claim 30 wherein the  
2 virtual storage request comprises a read request, the controller further returning all  
3 blocks in the access sequence before the problematic block in response to the virtual  
4 storage request.

1                   32. (original) A virtual storage controller for servicing a virtual  
2 storage request placed to a virtual storage device, the virtual storage request  
3 comprising a logical sequence of a plurality of blocks stored on a plurality of physical  
4 storage devices, the virtual storage controller cancelling any requests to access blocks  
5 later in the logical sequence than a problematic block the access of which generated  
6 an access error, the virtual storage controller cancelling all requests to access blocks  
7 after receiving a communication error from any physical storage device.